

**REMARKS**

Claims 1-4 and 6-14 are pending in this application. Applicants amend the specification and claims 1 and 13. Support for the amendment to claim 1 can be found in paragraph 18 of the specification. Claim 13 is amended only to recite “the;” and the Abstract has been amended only in order to comprise less than 150 words. No new matter is added.

**I. Abstract**

The Examiner indicates that the Abstract is not in proper form. The Abstract should not exceed 150 words in length and should exclude legal phraseology where possible.

Applicants hereby amend the Abstract to contain less than 150 words.

**II. Claim Objection**

Claim 13 is objected to for containing informalities. The Examiner takes the position that the recitation “wherein perovskite crystals belong to...” should be rewritten as “wherein the perovskite crystals belong to...”.

Applicants amend claim 13 to recite “wherein the perovskite crystals belong to...” in the manner suggested by the Examiner.

**III. Rejection under 35 U.S.C. §103(a)**

A. Claims 1-4, 6-10 and 12-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al (U.S. Patent 6,093,339) in view of Kennedy et al (U.S. Publication No. 2003/0199228).

Kimura et al was cited as disclosing a ceramic composition meeting each of the terms of instant claim 1, except for M3, which represents a metallic element of a sintering aid component. The Office Action relied on Kennedy et al as teaching a piezoelectric ceramic composition

**AMENDMENT UNDER 37 C.F.R. § 1.111**  
**U.S. Application No.: 10/558,383 (Q90710)**

including M3 which represents a metallic element of a sintering aid component within the claimed amount. The reason for rejection was that it would have been obvious to include a sintering aid M3 of Kennedy et al in the ceramic composition of Kimura et al so as to obtain a ceramic composition that is more easily sintered.

Applicants respectfully traverse the rejection.

In Kimura et al., there is no express lower limit on the amount of Na (x) ( $x \leq 0.9$ ).

However, Kimura et al. discloses the inequalities " $x + y \geq 0.75$ ;" and " $0.02 = y \leq 0.3$ ." Hence, the composition described in Kimura et al is represented by the inequality  $x \geq 0.45$ .

Additionally, Kimura et al. describes the amount of K as represented by the inequality " $1 - x - y$ ." Thus, because " $x + y \geq 0.75$ ," as described above, the amount of K can be calculated as being in the range from 0 to 0.25. Hence, the ratio between the amount of Na and the amount of K (K/Na) in the composition described in Kimura et al. is in the range from 0 to 0.56 (0.25/0.45).

In contrast, amended instant claim 1, from which all remaining claims depend, recites the inequalities " $0.2 \leq a < 0.5$ ;" and " $0 < b \leq 0.25$ ." Thus, the lower limit of the ratio (a/b) between the amount of Na and the amount of K in the present invention can be calculated as 0.80 (0.2/0.25).

Because the maximum value of the ratio between the amount of Na and the amount of K of the piezoelectric ceramic composition described in Kimura et al. is calculated as 0.56, whereas the same ratio for the claimed invention is calculated as 0.80, the compositions described in Kimura et al. are outside the scope of the amended claims.. Moreover, Kimura et al. does not

teach, suggest or otherwise provide any motivation for an artisan to modify the composition in Kimura et al. so as to satisfy the ratio of (K/Na) within the range of the present invention.

Kennedy et al. discloses that less than 2% by mass of a sintering aid comprising  $\text{Fe}_2\text{O}_3$  or the like can be added to its “ceramic composition” (see paragraph [0055]). The Office Action cites this passage as an indication that Kennedy et al. teaches the inclusion of “M3” in the piezoelectric ceramic composition (see Office Action: page 4, second paragraph). However, the ceramic composition disclosed in Kennedy et al. is used as a “wrapping carrier” (see the claims and the reference numeral (10) in FIG. 2); and is not a piezoelectric ceramic composition. Further, Kennedy et al. nowhere discloses the technical idea of adding a sintering aid comprising a material that does not impair the piezoelectric characteristics possessed by the base composition of its “ceramic composition.” Accordingly, Kennedy et al. nowhere refers to using its ceramic composition as a piezoelectric ceramic composition, nor the advantages obtained by such use. In fact, the “ceramic composition” disclosed in Kennedy et al. is intended for improved electrostatic discharge characteristics (i.e., “ESD”; see paragraph [0013]). Kennedy et al.’s composition is not intended to improve “piezoelectric characteristics,” as is one objective of the present invention (note the relation between “M3” and the improvement of “piezoelectric characteristics” at, for example, paragraphs [0014] and [0015] in the present specification).

The relationship between the piezoelectric characteristics of a piezoelectric ceramic composition and sintering aids is not well-known in the art. It is also not well known to add a sintering aid comprising a specific material (M3) in order to obtain a piezoelectric ceramic composition in which the preferred piezoelectric characteristics have been preserved. Kennedy et al. thus at least fails to teach or suggest including a specific sintering aid in a piezoelectric

ceramic composition in order to obtain a piezoelectric ceramic composition in which the preferred piezoelectric characteristics of the base composition have been preserved.

In view of the foregoing, it would not have been obvious to look to Kennedy et al. to make up for the deficiencies of Kimura et al. because Kimura et al. does not disclose the claimed K/Na ratio or significance thereof; and Kennedy et al. nowhere discloses improving the piezoelectric characteristics of a piezoelectric ceramic composition. Additionally, even if it were appropriate to combine the cited references, the resulting combination would still not meet all of the limitations of claim 1 from which all other claims depend.

Withdrawal of the rejection is respectfully requested.

**B.** Claim 11 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al in view of Kennedy et al and Nishida et al (U.S. Publication 2002/0066882). The Examiner applies the combination of Kimura et al and Kennedy et al as discussed above, and further relies on Nishida et al as disclosing that the composition contains metallic element Sb, wherein Nb in the formula is partially substituted by Sb. The reason for rejection was that it would have been obvious to combine Nishida et al with Kimura et al and Kennedy et al to obtain a well-known functional alternative to Nb and Ta.

Applicants respectfully traverse the rejection and submit that the arguments and amendments made above to overcome the above rejection over Kimura et al in view of Kennedy et al., also overcome the instant rejection. Nishida et al nowhere remedies the deficiencies of either Kimura et al or Kennedy et al with respect to the features of instant claim 1.

Withdrawal of the rejection and allowance of claims 1-4 and 6-14 are earnestly solicited.

**IV. Conclusion**

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The U.S. Patent and Trademark Office is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


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CUSTOMER NUMBER

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